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ABSTRACT

Research was conducted to determine the degree to which sampling vs. comparison processes account for age changes in referential communication. Children at three different grade levels communicated referents within related and unrelated word pairs. The word pairs used were from Cohen and Klein (1968). From their list of 30 related pairs, half were randomly sampled and served as the related pairs. The other half were used to compose unrelated pairs; to form these pairs, each similar nonreferent was replaced by a word dissimilar to the referent. The procedure consisted of asking children to communicate sinle word clues for each referent in the 30 word pairs. Clues with each word pair were then given to adult listeners who tried to identify the intended referent in each pair. Accuracy scores for each subject were based on the number of correct listener identifications. Twenty children in the 2nd, 4th, and 6th grades served as subjects. Half of the children at each grade level were randomly assigned to one of two experimental groups. The data from both groups indicated high accuracy at all ages on unrelated pairs and significant age improvement from second to sixth grade on related pairs. These results provide support for a comparison explanation of age differences in communication. Two additional studies were performed to evaluate two alternatives to the comparison explanation. Results from the three studies demonstrate younger children's communication difficulty in providing effective discriminative messages when required by the task. (Author/DB)

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INFLUENCE OF SAMPLING AND COMPARISON PROCESSES ON THE DEVELOPMENT OF COMMUNICATION EFFECTIVENESS

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A number of paradigms have been developed recently to study the psychological processes contributing to communication performance. One approach, taken by Rosenberg and Cohen (1966), has generated research with adults and children. Rosenberg and Cohen propose a two-stage theory to account for referential communication processes. In the first stage, the sampling stage, the speaker, given the task of communicating a referent, is said to sample a response from a hierarchy of associations to the referent. The probability of sampling a response is proportional to its occurrence as a word associate. In the second stage the comparison stage, the speaker is said to compare the associative value of the sampled response to the referent and possible nonreferents. If the associative value to the referent is greater, the word is emitted; if the value is smaller, the response is rejected and the sampling process begins again.

A number of studies with adults demonstrate the operation of sampling and comparison processes in referential communication. Rosenberg and Cohen (1966) provide the most direct evidence of sampling activity. They use a word game in which the speaker must communicate a clue so that a listener can identify the referent within a pair of words. The referent is underlined for the speaker but unknown to the listener. With this task, Rosenberg and Cohen found that communication responses to the referent could be predicted from word association data alone. Words with the highest associative value were more likely to be produced as communications. Evidence of comparison process in communication is found in a number of studies that have varied the degree of similarity between referent and nonreferent. When the referent and nonreferent are unrelated (e.g., *mountain*-rest) only sampling processes should be necessary for effective communication. However, with related words (e.g., *ocean*-river) comparison as well as sampling activity should be required. Research with adults has shown that (*a*) the degree of predictability of clue data from association data is less on related than unrelated pairs (Rosenberg & Cohen, 1966); (*b*) more words are required to communicate similar than dissimilar referents (Krauss & Weinheimer, 1967); and (*c*) speaker time in emitting a response increases as similarity increases (Smith, 1970).

The Rosenberg and Cohen model has implications regarding the communication skills that children must develop to communicate effectively. The sampling stage suggests the relevancy of vocabulary growth. The comparison stage suggests the importance of children's awareness that communication involves discriminative messages. Research with children could be done with attention to the separation of sampling, comparison, and other potentially relevant processes. Instead, the general research strategy with children has been to demonstrate age changes in communication accuracy, with few operations used to separate various processes. In many studies, age has been the sole independent variable, thus allowing for little basis for inference from communication performance to underlying process.

One study, emerging from the Rosenberg and Cohen paradigm, illustrates this general approach. Cohen and Klein (1968) tested third-, fifth-, and seventh-grade children on 30 related word pairs. The child communicated single word clues to a peer listener. Results indicated that accuracy increased with age; seventh-grade *S*s were significantly more effective communicators than third-grade *S*s. Cohen and Klein suggested that age differences were due to increased sampling skill; however, the results do not provide a basis for determining whether improvement was a function of increased sampling, comparison, or some other skill. The use of a single type of word pair without any additional procedures to eliminate alternative explanations makes interpretation of the data difficult.

The present research was conducted to determine the degree to which sampling vs. comparison processes account for age changes in referential communication. Children at three different grade levels communicated referents within related and unrelated word pairs. The word pairs used in the present study were from Cohen and Klein (1968). From their list of 30 related pairs, half were randomly sampled and served as the related pairs. The other half were used to compose unrelated pairs; to form these pairs, each similar nonreferent was replaced by a word highly dissimilar to the referent.

The procedure consisted of asking children to communicate single word clues for each referent in the 30 word pairs. Clues with each word pair were then given to adult listeners who tried to identify the intended referent in each pair. Accuracy scores for each *S* were based on the number of correct listener identifications. Twenty children in the second, fourth, and sixth grades served as *S*s. Half of the children at each grade level were randomly assigned to one of two *E*s.

RESULTS AND DISCUSSION

An analysis of variance performed on communication accuracy data showed a significant $E \times$ Pair Type interaction ($F = 4.645$, $p < .05$). Accordingly, data are presented separately for each E.

The data for E_1 indicates high communication accuracy on unrelated pairs at each grade level. Second-, fourth-, and sixth-grade children had accuracy scores of 13.8, 14.6, and 14.5, respectively. On related pairs, however, younger children's communication accuracy was rather low and there was improvement with age. Second-, fourth-, and

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sixth-grade *S*s averaged 9.3, 10.3, and 11.6, respectively. Comparison between means within each pair type was made by using Dunn's multiple-comparison procedure (Kirk, 1968). Compared to a required critical mean difference of 1.818, none of the differences on unrelated pairs were significant. On related pairs, however, the difference between the second and the sixth grade was statistically significant.

The data for E_2 show the same pattern. On unrelated pairs, the accuracy averages for second, fourth, and sixth grades were 13.8, 14.5, and 14.6, respectively. On related pairs, the corresponding scores were 8.4, 8.8, and 10.6, respectively. Compared to a required critical mean difference of 2.059, none of the age differences on unrelated pairs were significant. Again, on related pairs, the difference between second- and sixth-grade *S*s was significant.

The data from both *E*s, then, indicate high accuracy at all ages on unrelated pairs and significant age improvement from second to sixth grade on related pairs. These results provide support for a comparison explanation of age differences in communication. On unrelated pairs, which require only sampling activity, children were quite accurate at all ages. On related pairs, which require comparison as well as sampling activity, there was a significant increase in accuracy from second to sixth grade.

Although the comparison explanation of developmental changes is quite plausible, rival interpretations exist. First, it is possible that children's poor related pair communication is the result of a limited sampling repertoire rather than lack of a comparison concept. Related word pairs undoubtedly place greater demands on vocabulary, and the young child, although perhaps capable of engaging in comparison activity, may lack the differentiated vocabulary required to demonstrate competency. A second alternative explanation is that younger children may perform poorly on related word pairs because they fail to appreciate the task demands implicit in the situation in which referent and nonreferent are similar. Two additional studies were performed to evaluate each of these alternatives to the comparison explanation.

ADDITIONAL STUDIES

To more fully evaluate the limited sampling repertoire hypothesis, a study was conducted in which children were tested in one of two conditions: In the "production" condition, children produced clues as in the previous study; in the "recognition" condition, children chose a clue from two available alternatives. These clues were chosen from the previous study's response data. One clue had been highly effective and the other had been effective no more than chance. The purpose of the recognition condition was to determine whether younger children would communicate as effectively as older children when provided with potentially effective clues from which to choose. If communication deficiency on related pairs is due to sampling deficiency, then this procedure ought to enable younger children to perform as well as older *S*s. Alternatively, if comparison deficiency is contributing to the results, then the recognition condition ought to reveal the familiar pattern of age differences.

Results from the production condition replicated the results of the previous study: there was high accuracy on unrelated pairs at all ages, and improvement with age on related pairs. In the recognition condition, the results were complex; however, in general, the same age pattern for each type of word pair emerged. Providing an available vocabulary did not improve younger children's related pair performance; this suggests that poor related word-pair performance is not the result of limited sampling repertoire.

A third study was conducted to determine whether elaboration of task demands would facilitate younger children's performance, thereby reducing or eliminating age differences. The *S*s were told that some of the words to be communicated appeared with a highly similar word and were asked to examine each of the word pairs and label them "similar" or "not similar." After each *S* had labeled the set of word pairs, *S* was told that it is important, on similar pairs, to give a clue that would be "good only for the underlined word" but "not have anything to do with the other word." Finally, *S* was provided with two positive and two negative examples of clues for related word pairs and asked to say whether each clue was "good" or "bad." Results from this study indicated that children were able, at each grade level, to appropriately label the word pairs. However, the elaboration of the task demands did not reduce age differences in related word-pair communication accuracy. Once again, second-grade children were significantly less accurate than sixth-grade children in communicating related word-pair referents. Thus it appears that younger children's poor communication in the previous studies cannot be explained by limited explanation of the task demands.

CONCLUSIONS

Results from the three studies demonstrate younger children's communication difficulty in providing effective discriminative messages when required by the task. The failure to produce effective related word-pair messages appears not to be explained by limited sampling repertoire or insufficient task instructions. Instead, an explanation based on comparison process appears plausible. Future research should examine possible bases of younger children's failure to engage in comparison activity.

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